

## PART 1 - GENERAL

### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

#### THE ALUMINUM ASSOCIATION, INCORPORATED (AA)

AA 45	(1980) Aluminum Finishes
AA 46	(1978) Anodized Architectural Aluminum

#### AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S303	(1992) Steel Buildings and Bridges
AISC S335	(1989) Structural Steel Buildings Allowable Stress Design and Plastic Design
AISC S342L	(1993) Load and Resistance Factor Design Specification for Structural Steel Buildings

#### AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.2.1	(1996) Square and Hex Bolts and Screws Inch Series
ANSI B18.6.2	(1972; R 1993) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws
ANSI B18.6.3	(1972; R 1997) Machine Screws and Machine Screw Nuts

#### AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B18.21.1	(1994) Lock Washers (Inch Series)
ASME/ANSI B18.22.1	(1965; R 1998) Plain Washers

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	(1996) Carbon Structural Steel
ASTM A 47	(1990; R 1995) Ferritic Malleable Iron Castings
ASTM A 53	(1996) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 123	(1997; Rev. A) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 500 (1996) Cold-Formed Welded and Seamless Carbon Steel  
Structural Tubing in Rounds and Shapes

ASTM D 1187 (1997) Asphalt-Base Emulsions for Use as Protective  
Coatings for Metal

ASTM E 488 (1996) Strength of Anchors in Concrete and Masonry  
Elements

AMERICAN WELDING SOCIETY, INC. (AWS)

AWS D1.1 (1998) Structural Welding Code - Steel

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.27 Fixed Ladders

FEDERAL SPECIFICATIONS (FS)

FS TT-P-664 (Rev. D) Primer Coating, Alkyd, Corrosion-Inhibiting,  
Lead and Chromate Free, VOC-Compliant

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS  
(NAAMM)

NAAMM PR (1995) Pipe Railing Manual

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP 3 (1995) Power Tool Cleaning

SSPC SP 6 (1994) Commercial Blast Cleaning

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

1.2.1 SD-02, Shop Drawings

- a. Fabrication drawings of steel stairs
- b. Access doors and panels, installation drawings
- c. Handrails, installation drawings
- d. Ladders, installation drawings
- e. Embedded angles and plates, installation drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 5303.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the building construction.

### 1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1. Use procedures, materials, and equipment of the type required for the work.

### 1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Structural Carbon Steel

ASTM A 36

#### 2.1.2 Structural Tubing

ASTM A 500.

#### 2.1.3 Steel Pipe

ASTM A 53, Type E or S, Grade B.

#### 2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A 47.

#### 2.1.5 Epoxy Anchors

Provide 5/8 in. diameter A193GR.B7 Steel epoxy anchors. Minimum concrete embedment shall be 5 in. Design values listed shall be as tested according to ASTM E 488.

a. Minimum allowable pullout value shall be 5720 lb .

b. Minimum allowable shear value shall be 6520 lb .

#### 2.1.6 Screws

ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3.

#### 2.1.7 Washers

Provide plain washers to conform to ASME/ANSI B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME/ANSI B18.21.1.

## 2.2 FABRICATION FINISHES

### 2.2.1 Shop Cleaning and Painting

#### 2.2.1.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints, but coat with rust preventative applied in the shop.

#### 2.2.1.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

### 2.2.2 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

#### 2.2.2.1 Unexposed Sheet, Plate, and Extrusions

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA 45, or AA 46.

## 2.3 ACCESS DOORS AND PANELS

Provide flush type access doors and panels. Fabricate frames for access doors of steel not lighter than 14 gage with welded joints and anchorage for securing into construction. Provide access doors of not lighter than 14 gage steel, with stiffened edges and welded attachments. Provide access doors hinged to frame and with a flush-face, turn-screw-operated latch. Provide exposed metal surface with a baked enamel finish. Provide pin-tumbler cylinder locks with appropriate cams in lieu of screwdriver-operated latches.

## 2.4 HANDRAILS

Design handrails to resist a concentrated load of 250 lbs in any direction at any point of the top of the rail or 20 lbs per foot applied horizontally to top of the rail, whichever is more severe. NAAMM PR, provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts.

### 2.4.1 Steel Handrails, Including Carbon Steel Inserts

Provide steel handrails, steel pipe conforming to ASTM A 53. Provide steel railings of 1 1/2 inches nominal size.

- a. Fabrication: Joint posts, rail, and corners by one of the following methods:

- (1) Flush-type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.

(2) Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

## 2.5 LADDERS

Fabricate vertical ladders conforming to Section 7 of 29 CFR 1910.27. Use 3" by 3/8 inch steel flats for stringers and 1 inch diameter steel rods for rungs. Rungs to be not less than 16 inches wide, spaced one foot apart, plug welded or shouldered and headed into stringers. Install ladders so that the distance from the rungs to the finished wall surface will not be less than 7 inches. Provide heavy clip angles riveted or bolted to the stringer and drilled for not less than two 5/8" diameter epoxy anchor as indicated. Provide intermediate clip angles not over 48 inches on centers.

## 2.6 MISCELLANEOUS PLATES AND SHAPES

Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames. Provide angles and plates, ASTM A 36, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A 123.

## 2.7 STEEL STAIRS

Provide steel stairs complete with stringers, metal-pan concrete-filled treads landings, columns, handrails, and necessary bolts and other fastenings. Steel stairs and accessories to be shop painted.

### 2.7.1 Design Loads

Design stairs to sustain a live load of not less than 100 pounds per square foot, or a concentrated load of 300 lbs applied where it is most critical. Conform to AISC S335 or AISC S342L with the design and fabrication of steel stairs, other than a commercial product.

### 2.7.2 Materials

Provide steel stairs of welded construction except that bolts may be used where welding is not practicable. Screw or screw-type connections are not permitted.

- a. Structural Steel: ASTM A 36.
- b. Support metal pan for concrete fill on angle cleats welded to stringers or treads with integral cleats, welded or bolted to the stringer. Provide composite steel deck, as specified in Section 05310, at landings close exposed ends.
- c. Before fabrication, obtain necessary field measurements and verify drawing dimensions.
- d. Clean metal surfaces free from mill scale, flake rust and rust pitting prior to shop finishing. Weld permanent connections. Finish welds flush and smooth on surfaces that will be exposed after installation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

Install items at locations indicated, according to manufacturer's instructions. Items listed below require additional procedures.

### 3.2 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

### 3.3 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

### 3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

### 3.5 FINISHES

#### 3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

#### 3.5.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

#### 3.5.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

### 3.6 ACCESS PANELS

Install a removable access panel not less than 12 by 12 inches directly below each valve, flow indicator, damper, or air splitter that is located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible. Install other access panels as indicated on the drawings.

### 3.7 HANDRAILS

#### 3.7.1 Steel Handrail

Install by welding to stringers or structural steel frame work. Grind welds smooth and painted.

### 3.8 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Secure to masonry or concrete with not less than two 5/8 inch diameter epoxy grouted bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel.

### 3.9 STEEL STAIRS

Provide bolts, washers, and all parts or devices necessary for proper installation. Provide lock washers under nuts.

END OF SECTION